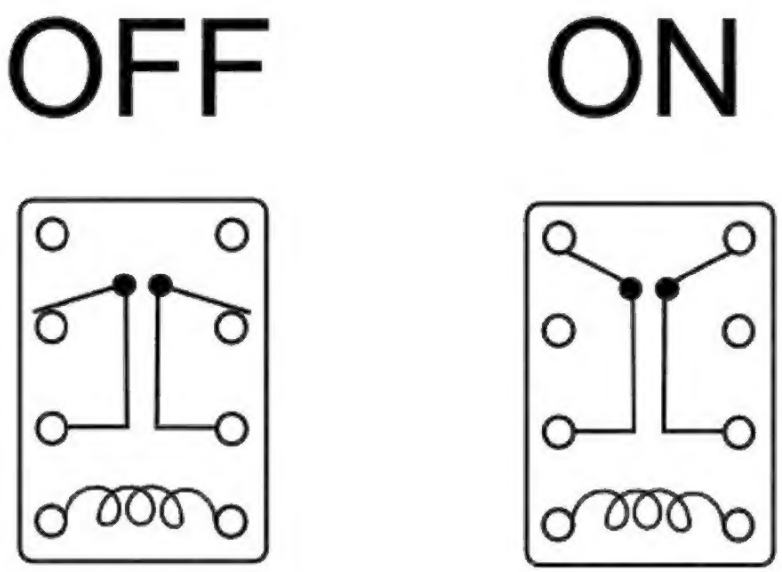
Non- IC logic gates methods



Logic gates can be built without integrated circuits (ICs) using discrete electronic components or mechanical methods. Common approaches involve using diodes, transistors, relay's or switches.
Methods for Building Logic Gates without ICs.
The primary methods rely on basic components acting as switches:

1. Resistor-Transistor Logic (RTL):
These methods use combinations of resistors, diodes, and transistors to create logic functions. Transistors act as switches that are either fully on or off (saturated), while diodes can direct current flow.

*** A NOT gate (inverter):**
can be built with a single transistor and a couple of resistors. When the input to the transistor's base is high, the transistor turns on and the output goes low (ground); when the input is low, the transistor is off and the output is high (connected to Vcc via a resistor).

*** NAND and NOR gates:**
are naturally implemented using transistors in series or parallel configurations, and these can then be combined to form all other basic logic gates.

2. Diode Logic (DL):
Simple AND and OR gates can be constructed using only diodes and a resistor.

*** For an OR gate with two inputs:**
If either input is high (voltage present), the corresponding diode conducts, and the output is high.
*** For an AND gate:**
Both inputs must be high for the output to be high; otherwise, the current is directed elsewhere, or the output remains low.

3. Switch and Relay Logic:
The most fundamental way to illustrate logic is with physical switches or relays.
*** Series-connected switches:**
Perform the AND function (both A and B must be closed for current to flow).
*** Parallel-connected switches:**
Perform the OR function (either A or B can be closed for current to flow).
*** Relays:**
Can be configured as inverters or more complex gates, as they have both normally open and normally closed contacts, allowing for the implementation of NOT functions.

These methods were used in early computers,telecom and logic systems before the advent of integrated circuits, demonstrating the underlying principles of digital logic.

See also

What is a Logic gates and where used in PLC ?

https://archive.org/details/what-is-logic-gates/

By: Haytham Zeidan

https://archive.org/details/@wazefapress

Resources:

https://www.eleccircuit.com/the-logic-gate-without-ic/

https://www.slideshare.net/slideshow/logic-gate-implemeting-without-using-i-cs/43872466

https://www.ovaga.com/blog/energy-harvesting/what-is-integrated-circuit-design-how-to-design-

https://en.wikipedia.org/wiki/Fan-out

https://www.electronics-tutorials.ws/logic/logic-gates-using-transistors.html

https://www.electronics-tutorials.ws/logic/logic_4.html

https://www.rs-online.com/designspark/basic-formation-of-digital-logic-gates

https://testbook.com/digital-electronics/not-gate

https://archive.org/details/@wazefapress/lists/1/electronics-technician-